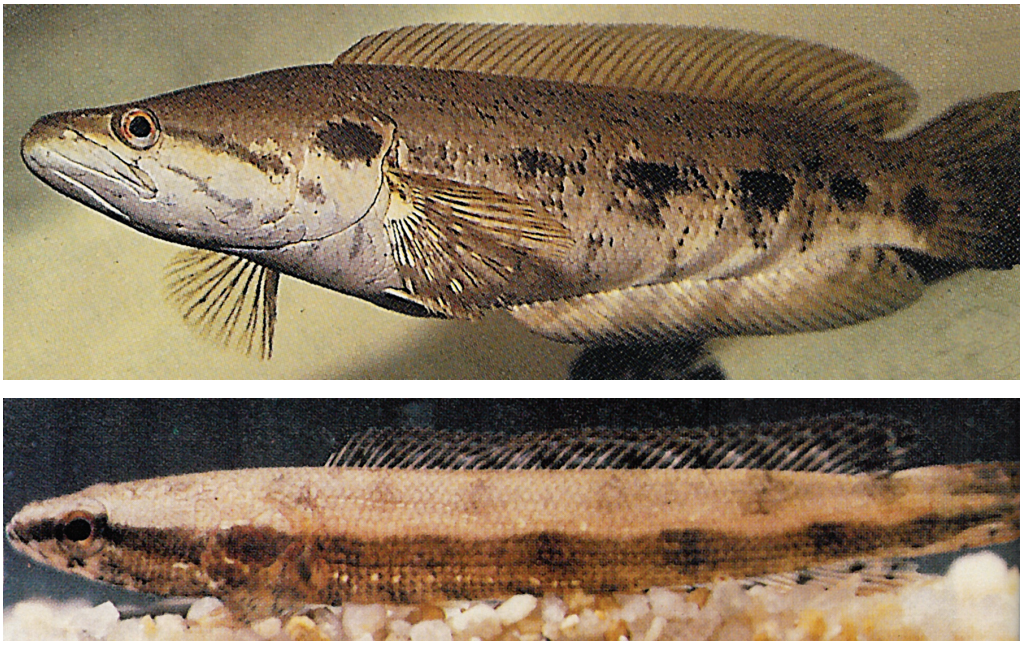
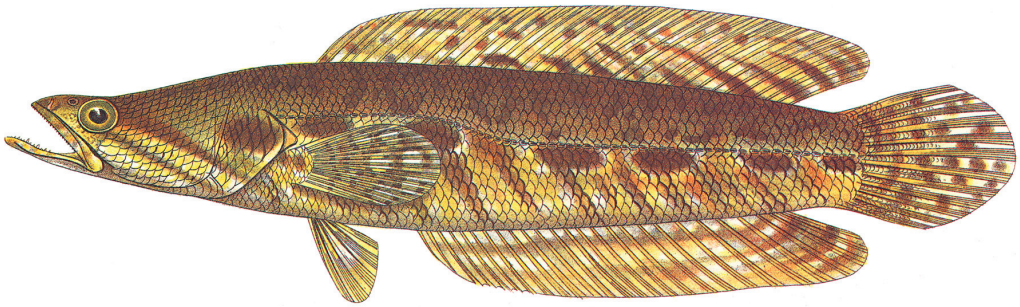
Channa lucius (Cuvier, 1831)
Splendid Snakehead



Upper image: adult. **Lower image:** juvenile.

Reprinted with permission from P.K.L. Ng from: Lee, P.G., and P.K.L. Ng. 1991. The snakehead fishes of the Indo-Malayan region. Nature Malaysiana 16(4):112-129.



After Bleeker, 1878

Original description: *Ophicephalus lucius* Cuvier *in* Cuvier and Valenciennes, 1831:416. Histoire naturelle des poissons 7:i-xxix + 1-537, pls. 170-208. Type locality: Java. Holotype: RMNH, whereabouts unkown.

Synonyms: *Ophiocephalus polylepis* Bleeker, 1852:578.

Ophiocephalus bistriatus Weber and de Beaufort, 1922.

Ophiocephalus bivittatus Károli, 1822. Name preoccupied by *Ophiocephalus bivittatus* Bleeker, 1845, changed to *Channa bistriata* by Weber and de Beaufort, 1922.

Ophicephalus siamensis Günther, 1861 (Musikasinthorn and Taki, 2001).

Channa bistriata Weber and de Beaufort, 1922 (young of *C. lucius* [Alfred, 1964]).

Common names: **splendid snakehead;** forest snakehead; ikan bujok or ikan ubi (Malaysia), runtuk (Kalimantan), trey kanh chorn chey (Cambodia); bujok (Mayay; Lim and Ng, 1990).

Native range: Rivers of southeastern Sumatra and the Kapuas basin of western Kalimantan (southern Borneo; Roberts, 1989); Mekong basin of Laos (Kottelat, 2001a). Kottelat (1985) and Ismail (1989) included China, Vietnam, Laos, Thailand, Malaysia, Kalimantan, Java, and Sumatra in the native range. Peter Ng (personal commun., 2003) collected this species during November 1999 and April 2000 in central Sumatra, southern Sarawak, and the Mahakam and Kayan basins of eastern Kalimantan.

Introduced range: No introductions known.

Size: To 40 cm.

Habitat preference: Kottelat (2001a) stated preference for streams in forested areas where the species lives among vegetation. Lim and Ng (1990) indicated a preference for forest streams and peat swamps. Lee and Ng (1994) said the species occurs in lakes, ponds, shaded forest streams, peat swamps, and mid-depths of rivers, showing a preference for faster moving waters. pH range is 5.5-6.0 and the species is said to be crepuscular or nocturnal (Lee and Ng, 1994). Rainboth (1996) cited preferred habitat as "slowly moving streams and rivers as well as lakes, ponds, and reservoirs from Thailand to Indonesia. Usually found in areas with much aquatic vegetation as well as submerged, woody plants…"

Temperature range: Lee and Ng (1994) recorded the fish in waters between 24-29 ºC, indicating a tropical/subtropical species.

Reproductive habits: A nest builder like other channids, with both parents guarding developing eggs and larvae (Lee and Ng, 1994). No information located on fecundity.

Food preferences: Lee and Ng (1994) cited the species as "a midwater or surface predator relying on camouflage to ambush its prey, mainly fish." Rainboth (1996) stated that this species preys "on fishes, prawns, and crabs and slightly less on shrimps."

Characters: Patch of scales present on gular region of head. Large canine teeth present on prevomer and palatines. Upper profile of head somewhat concave. Lateral line scales 58-65; 5½ scales between lateral line and base of anterior dorsal rays. Dorsal rays 38-41; anal rays 27-29. Sides of body with series of distinct, dark "porthole" blotches, oblique bars on belly, and slightly elongated, dark blotch on operculum (Ng and Lim, 1990; Lee and Ng, 1991). Juveniles with three dark stripes from head to caudal fin base.

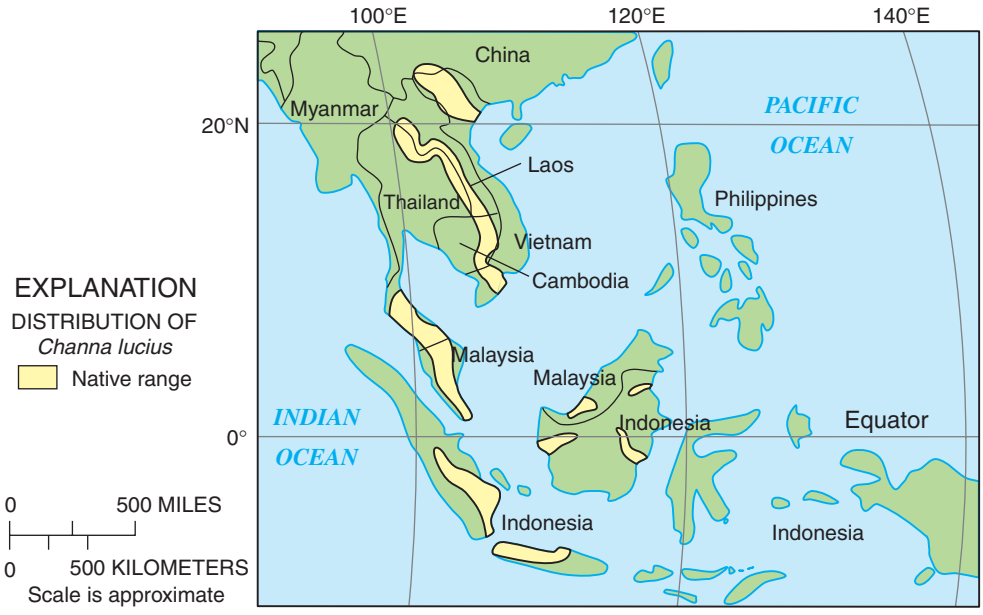
Ismail (1989) stated that this species has one or two rows of primarily canine teeth on the prevomer and palatines.

Commercial importance in the United States: Rarely mentioned on aquarist-oriented websites and probably of little or no importance in the domestic aquarium fish trade. No information on its past availability in live-food fish markets.

Commercial importance in native range: Ng and Lim (1990) listed this species as the third most highly prized food fish in southeastern Asia, where channids bring S$10-20/kg when fresh. Only *Channa micropeltes* and *C. striata* are more popular in live-food fish markets. It is also sold in the Singapore aquarium fish trade (Ng and Lim, 1990). It is sold fresh, frequently alive, in Cambodia (Rainboth, 1996).

Environmental concerns: This species is known to be a nocturnal thrust predator, with a preference for other fishes. Its natural range includes tropical and subtropical climate zones, indicating that if introduced, this species could establish only in similar climates or thermal springs and their outflows.

Comments: The diploid number of chromosomes of *Channa lucius* is 48 (Donsakul and Magtoon, 1991).



Channa lucius

Channa maculata (Lacepède, 1802)
Blotched Snakehead

Original description: *Bostrychus maculatus* Lacepède, 1801:140, 143. Histoire naturelle des poissons 3:i-lxvi + 1-558, pls. 1-34. Type locality: none designated. No type specimens.

Synonyms: *Ophicephalus guentheri* Sauvage and Dabry de Thiersant, 1874:4.

Ophicephalus lucius Koller, 1927:41, pl. 1, fig. 7.

Ophicephalus tadianus Jordan and Evermann, 1902:1289.

Ophiocephalus marmoratus Brind, 1914:11.

Common names: **blotched snakehead**. No other English names known; hei-yü (Tungting Lake, China; Nichols, 1943); tai wan li (Mandarin); lê-hî (Taiwan; Shen and Tzeng, 1993); Taiwan-dojô (Japan and Taiwan; Uyeno and Arai, 1984; Hosoya, 2002); fibata (Madagascar; Paul V. Loiselle, personal commun., 2003).

Native range: southern China, south of the Chang Jiang (Yangtze) basin and Hainan (Nichols, 1943; Okada, 1960; Hay and Hodgkiss, 1981; Uyeno and Arai, 1984); northern Vietnam (Kotellat, 2001a).

Introduced range: Taiwan (established); introduced into Japan beginning in 1916 from Taiwan, established in Nara, Hyôgo, Hiroshima, Mie, and Shiga prefectures, Japan, as of 1960 (Okada, 1960; Liang and others, 1962; Hay and Hodgkiss, 1981; Uyeno and Arai, 1984; Shen and Tzeng, 1993); Philippines (Uyeno and Arai, 1984), and Madagascar (misidentified as *Channa striata*; Raminosoa, 1987; Welcomme, 1988; Reinthal and Stiassny, 1991; Stiassny and Raminosoa, 1994; Lever, 1996; Lévèque, 1998). Brind (1914) described a snakehead, *Ophiocephalus marmoratus*, from specimens supposedly acquired in Singapore and Malacca, Malaysia. "About 60 specimens, from 3 to 6 inches in length, were caught by a sailor of a merchant vessel and brought to New York direct" (Brind, 1914). There are no records of *C. maculata* having been introduced to either locality. The illustration that accompanied his description of this fish, although somewhat poor, appears to be of *C. maculata* and most certainly is not of any snakehead native to Singapore or Malaysia. Moreover, Brind (1914) commented that this fish "can stand cold water." Therefore, we have included *O. marmoratus* as a synonym of *C. maculata* and conclude that either the localities from which these specimens were obtained were in error or that they were acquired from Chinese traders in those two cities. A somewhat similar situation involving a bagrid catfish, *Hemibagrus elongatus*, the holotype of which was supposedly from Singapore, was reported (Kottelat and others, 1998) where the actual type locality

is believed to be China. Those authors also noted that although the type of *H. elongatus* might have come from Singapore, there had been active trade in Singapore of fishes imported from China for purposes of "food, aquaculture or accidentally" that would explain its Chinese origin. There are no type specimens of *O. marmoratus*.

This species may be one of the most widely introduced snakeheads in the Indian and Pacific Ocean basins. As of August 2002, it was becoming apparent that many reports of introductions and established populations of *Channa striata* in such places as Hawaii and Madagascar were based on misidentifications of *C. maculata* (Ralf Britz, personal commun., 2002). We have confirmed (October 2002) that the snakehead species recorded from Hawaii since the late 1800s is indeed *C. maculata* and not *C. striata.* See comments under **Introduced range** in the account for *C. striata*.

Channa maculata was introduced into Madagascar about 1978 by former President Didier Ratsiraka who had seen snakeheads at an aquaculture facility during an earlier visit to North Vietnam. The species he saw in North Korea was likely *C. argus*, but the species that was shipped to President Ratsiraka from China was *C. maculata.* The shipment was divided equally, one group stocked into ponds at the presidential summer residence near Antananarivo, adjacent to the headwaters of the Betsiboka River. The remaining fish were stocked into ponds at Ratsiraka's home near Vatomandry on the east coast. Subsequent floods from monsoons washed snakeheads out of ponds in both localities and into adjacent natural waters. By 1986, *C. maculata* was well established in floodplain lakes of the Betsiboka basin. Nearly the same occurred on the east coast of Madagascar. There is an extensive canal system (Pangalanes Canal) that includes many inland lakes along the Indian Ocean coast of Madagascar that extends for hundreds of kilometers north to south. Snakeheads entered this canal system from ponds near Vatomandry and spread rapidly, being recorded about 200 km north of Vatomandry near Toamasina, the northern terminus of the Pangalanes Canal, several years later. It also dispersed southward to the Mangoro River. The species apparently was also moved to other areas of Madagascar by Sino-Malagasy merchants (Paul V. Loiselle, personal commun., 2003). It was initially misidentified as *C. striata* beginning with Raminosoa (1987). Reports of *C. striata* from Mauritius are also possible misidentifications of *C. maculata*.

Size: To 33 cm (Okada, 1960) but reaches a length of more than 1 m when fully mature (William S. Devick, personal commun. to Paul L. Shafland, 2002).

Habitat preference: Streams, lakes, ponds and ditches in southern China; prefers shallow waters with vegetation (Okada, 1960; Hay and Hodgkiss, 1981).

Temperature range: Native range is subtropical to warm temperate. Nevertheless, Okada (1960) reported that in Japan, this species tolerated "seven days in 7 ºC air temperature out of water." Atkinson (1977), however, cited it as a "tropical" species. Nevertheless, this snakehead has become established far north of its native range and assumed climate tolerances in Japan, following its introduction there.

Reproductive habits: Builds a circular, open nest in vegetation. Eggs float to surface and are guarded by parents. Spawns in Japan in early summer (Okada, 1960).

Feeding habits: Reported to feed on crustaceans, large insects, frogs, and fishes (Okada, 1960; Hay and Hodgkiss, 1981); described as a "fierce predatory fish" that "hides among rocks or aquatic plants until its prey approaches, then it quickly attacks, kills, and swallows its victim" (Hay and Hodgkiss, 1981).

Paul V. Loiselle (personal commun., 2003) reported that a fisherman in Madagascar had observed young blotched snakeheads slithering onto land, allowing their bodies to be covered by ants, then returning to the water where the ants floated at the surface and were devoured by the juvenile snakeheads. He also commented that amphibian populations in Madagascar are probably being negatively affected by the introduced blotched snakehead. Historically, frog tadpoles in the central highlands were preyed upon to some extent by native eels (Anguillidae), but now those same waters contain considerable numbers of *Channa maculata*.

Characters: No patch of scales on gular region. Head profile slightly depressed. Dorsal rays 40-46; anal rays 26-30. Lateral line scales 41-60 with lateral line continuous; transverse scales below lateral line 11; 9 scale rows between posterior rim of orbit to upper edge of operculum. Color pattern similar to that of *Channa argus*; dark stripe from tip of snout through orbit extending to almost above anterior base of pectoral fin; second dark stripe from posteroventral corner of orbit to posteroventral edge of operculum; sides of body with two rows of large, dark blotches extending posteriorly to anterior caudal peduncle; blotches in the form of two bar-like markings on caudal peduncle;

dark markings toward mid-dorsal part of back extending up onto proximal part of dorsal fin. A key character for separating this species from *C. argus* are the bar-like markings on the caudal peduncle. In *C. maculata*, the most posterior dark bar (usually complete) is preceded and followed by pale bar-like areas, whereas in *C. argus* such pale markings are absent and the final dark marking is irregular, often blotch-like.

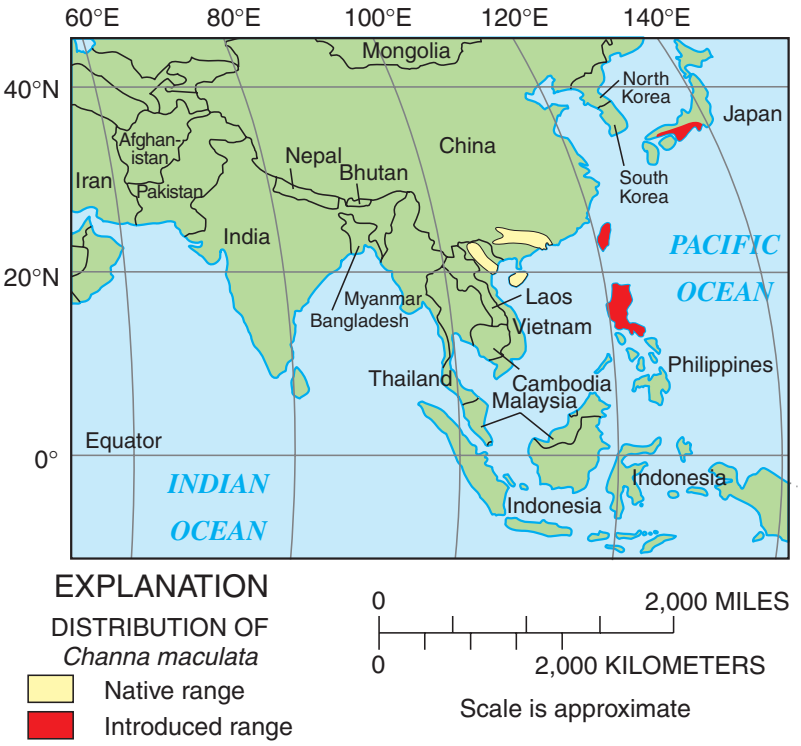
Commercial importance in the United States: Rarely mentioned on aquarist-oriented websites. Because it is a valuable food fish in southern China and Taiwan, we believed it could be available for sale in live-food fish markets. Ralf Britz (personal commun., 2002) confirmed that this species was one of the two snakeheads purchased from a live-food fish market in Boston, Massachusetts, in November 2001. A reexamination of the second specimen confirmed that it was also *Channa maculata*. We also noted from Federal records that imports of snakeheads from Guangdong Province, China, had increased during 2001. Because most culture of blotched snakeheads occurs in that province, the likelihood of availability of this northern snakehead "look-alike" in U.S. markets was increased. Ralf Britz (personal commun., 2002) also confirmed that the blotched snakehead has been present in Hawaii since before 1900, misidentified as *C. striata,* based on specimens in the U.S. National Museum of Natural History. We have learned that the species presently in culture in Hawaii as of 2002 is *C. striata* (Pam Fuller, personal commun., 2002), apparently imported in the early 1990s (Domingo Cravalho, Jr., personal commun., 2002).

Commercial importance in native range: Considered an important and valuable food fish in China (Nichols, 1943; Atkinson, 1977; Hay and Hodgkiss, 1981). It is the second most important snakehead species cultured in China with most culture activity located in Guangdong Province, southeastern China (Fang Fang, personal commun., 2002). Liang and others (1962) commented that it is only sold alive as a food fish within its introduced range in Taiwan.

Environmental concerns: This species is known to be a thrust predator feeding on large invertebrates and fishes. Moreover, its temperature tolerance indicates a species that could live in subtropical to temperate areas in the United States if introduced. That it is established throughout much of central Japan, an area located generally between 34-37º N, and its southernmost range in China is Hainan Island (about 19º N), is indicative of a species that has potential to establish from extreme southern Florida to North Carolina on the Atlantic Coast or central California on the Pacific Coast.

Comments: The diploid number of chromosomes of *Channa maculata* is 42 (Wu and others, 1986).

See map on following page



Distribution of *Channa maculata* in the Western Pacific basin

This species is also established on Oahu, Hawaii, and may prove to be a more widely introduced snakehead in the Indian and Pacific Ocean basins than previously known. See comments above and under **Introduced range** in the account for *Channa striata*.